PATENT ABSTRACTS OF JAPAN

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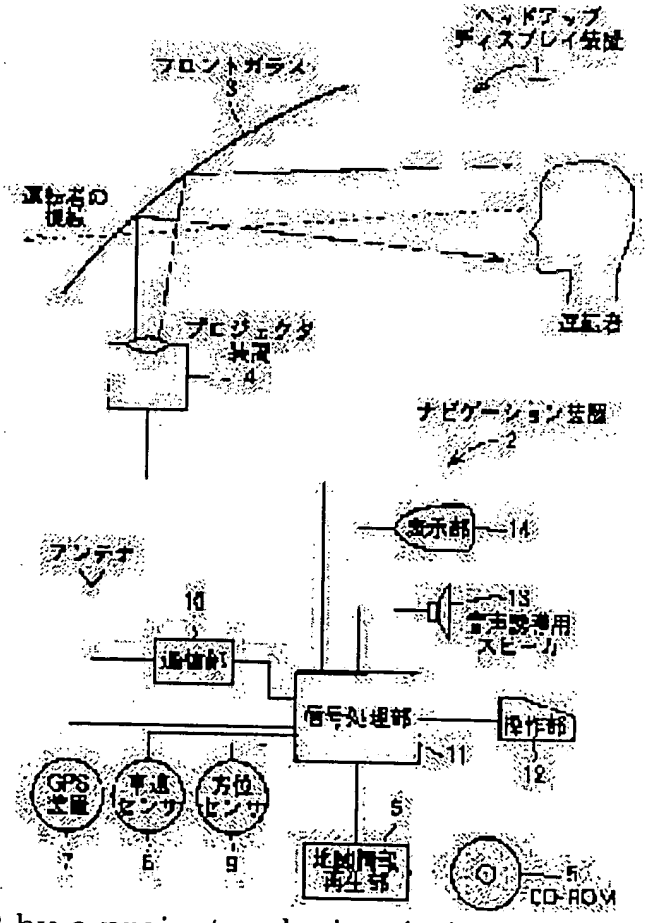
(54) HEAD-UP DISPLAY APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To secure a sufficient view field even when a display is made for a large area, by displaying a display image of a guide route above a road actually seen, with the use of a windshield.
SOLUTION: A display part map display-controlling means of a signal- processing part 11 forms a plan map from map data read out from a CD-ROM 5 by a reproducing part 6 and displays the map to a display part 14 after adding data such as the present position, an advancing direction, etc. A head-up display map display-controlling means of the processing part 11 generates a bird's-eye view from the plan map based on a position and a height of a viewpoint and a direction of a line of sight designated by bird's-eye viewpoint-designating data. The head-up display device 1 designates one of the plan map, the bird's-eye view and a course guide map and displays the designated one at an upper part of a windshield 3 by a projector device 4. Accordingly, the display of the map does not overlap with an actual scene in front of the advancing



direction and even the display of a large area does not obstruct, a driver's view field, thus ensuring the view field in front of the advancing direction.

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CLAIMS

[Claim(s)]
[Claim 1] HUD equipment characterized by displaying the display image of an induction path more nearly up than the road of a sight in the HUD equipment which projects an induction path using a windshield.
[Claim 2] The display image of said induction path is HUD equipment according to claim 1 with which the side near a car is characterized by being the image made [axial symmetry] to carry out vertical reversal centering on a display axis of abscissa so that a distant place may become the display screen bottom at the display screen bottom.
[Claim 3] HUD equipment according to claim 1 characterized by the display image of said induction path indicating the display axis of abscissa by rotation as a shaft at arbitration.
[Claim 4] The display image of said induction path is HUD equipment according to claim 1 characterized by being a bird's-eye view.
[Claim 5] HUD equipment characterized by making it display that a course guidance image laps with the road of a sight mostly in the HUD equipment which projects an induction path using a windshield while displaying the display image of an induction path more nearly up than the road of a sight.
[Claim 6] HUD equipment according to claim 5 characterized by what is displayed on the display image of an induction path with which the road section corresponding to the road section displayed with said course guidance image was displayed more nearly up than the road of said sight.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the HUD equipment of navigation equipment.
[0002]
[Description of the Prior Art] A HUD is used for JP,61-200571,A and the transit position read out device for cars with which made it make a road map and the current position of a self-car emerge in the visual field of the crew ahead of a car is indicated.
[0003] an operator looks at the road map by which coordinate transformation was carried out to the perspective display at JP,1-219883,A through a windshield to a windshield -- real -- it projects so that it may lap between the same distance as a view, and the display of the navigation system for mount equipped with a projection means to display as a HUD is indicated.
[0004]
[Problem(s) to be Solved by the Invention] The conventional display enables it to see display images (road map etc.) in the condition of not moving most looks from a travelling direction by displaying a road map and the induction bearing mark caudad rather than the height of a look while an operator operates, as shown in the conventional display position in drawing 3 .
[0005] However, possible in a display rectangle so that a display image may not serve as hindrance of a forward-viewing community, when displaying display images (road map etc.) on a look are . It restricts, and it is necessary to make it small or to make the contents of a display brief. For this reason, it was not suitable for displaying the road map and bird's-eye view of the comparatively large range.
[0006] It aims at offering the HUD equipment with which it would not be made in order that this invention might solve such a technical problem, and a large area display will not be the hindrance of a field of view, either.
[0007]
[Means for Solving the Problem] The HUD equipment applied to claim 1 in order to solve said technical problem is characterized by displaying the display image of an induction path more nearly up than the road of a sight.
[0008] The display image of an induction path has a side good for the display screen bottom near a car also as an image made [axial symmetry] to carry out vertical reversal centering on a display axis of abscissa so that a distant place may become the display screen bottom. Moreover, the display image of

an induction path may be made to indicate the display axis of abscissa at arbitration by rotation as a shaft. The display image of an induction path is good also as a bird's-eye view.

[0009] The HUD equipment concerning claim 5 is characterized by making it display that a course guidance image laps with the road of a sight mostly while it displays the display image of an induction path more nearly up than the road of a sight. It is desirable to display the road section corresponding to the road section displayed with the course guidance image on the display image of the induction path displayed more nearly up than the road of said sight.

[0010] Since an induction path is displayed more nearly up than the road of a sight, even if the HUD equipment concerning claim 1 displays a large area, it does not serve as hindrance of an operator's field of view.

[0011] Moreover, the display same with the whole path serving as a display gestalt by which it was indicated by projection high up in the sky, installing a huge mirror high up in the sky, and looking at the ground by carrying out vertical reversal and displaying a bird's-eye view, is made. For this reason, the situation of the front and the whole path can be grasped exactly. Although sense of incongruity may be felt the part which is not visible in the shadow of a building etc. in the usual bird's-eye view which does not carry out vertical reversal, the whole path can cancel sense of incongruity with the display gestalt projected high up in the sky.

[0012] Since the display image of an induction path is displayed more nearly up than the road of a sight, the contents of a display of the course guidance image it is displayed that laps with a sight can be made brief. Moreover, it becomes easy for the display of a course guidance image and the front sight to have piled up strictly, to be put together, and to grasp a course as there being nothing because the contrast with the road section displayed with the course guidance image and the applicable section in the display image of an induction path considers as an easy display gestalt.

[0013]

[Embodiment of the Invention] The gestalt of implementation of this invention is explained based on an accompanying drawing below. Drawing 1 is the whole HUD equipment block diagram concerning this invention. The HUD equipment 1 concerning this invention consists of projector equipment 4 which performs image display using navigation equipment 2 and a windshield 3.

[0014] The explanatory view in which drawing 2 shows the physical relationship of an operator and a look, and drawing 3 are the explanatory views showing the display position of the HUD equipment concerning this invention. The HUD equipment 1 concerning this invention displays an image on the location which serves as the upper part from an operator's look.

[0015] CD-ROM5 in which the navigation equipment 2 shown in drawing 1 stored road map data, The map information playback section 6 which reads road map data from CD-ROM5, The GPS equipment 7 which receives the electric wave from two or more GPS Satellites, and outputs LONG, the LAT, and advanced data, The vehicle speed (or mileage) sensor 8 and the bearing sensor 9, The communication link with VICS (Vehicle Information and Communication System), ATIS (Advanced TrafficInformation Service), etc. is performed. The newest traffic information It consists of the communications department 10 for receiving, the signal-processing section 11, a control unit 12, a loudspeaker 13 for voice induction, and a display 14 equipped with CRT, a liquid crystal display, etc.

[0016] The signal-processing section 11 is equipped with a self-vehicle location detection means, a routing means, a display lot Fig. display-control means, a car guidance-and-control means, an actuation input recognition means, and a HUD lot Fig. display-control means.

[0017] A self-vehicle location detection means is using together the dead reckoning equipment which operates the location of a car sequentially based on a bearing signal, and the vehicle speed, the vehicle speed from the mileage sensor 8 or the mileage signal from the bearing sensor 9 constituted using the gyroscope, the earth-magnetism sensor, etc., and the GPS equipment 7 of a car which detects a location absolutely, and even when the electric wave from a GPS Satellite cannot be received, it is considering as the configuration which can guess the current position of a car. Moreover, this self-vehicle location detection means compares a transit locus operation means to ask for a transit locus with the transit locus data and road map data outputted from this transit locus operation means, and is equipped with a map matching means to correct the current position of a car to a path on the street paying attention to the description part of transit loci, such as a crossing and an inflection point. A self-vehicle location detection means outputs the current position data and advance bearing data of a car.

[0018] A routing means will output the path data which set automatically and set up the path in which it results to the destination from the specified origin or the current position of a car with reference to road map data, if the course ground and an origin are inputted the destination and if needed from a control unit 12.

[0019] While a display lot Fig. display-control means reads map data including the current position of a car from CD-ROM5 through the map information playback section 6 and generates a map image, it generates the map image which includes a self-vehicle location mark based on the current position data and the advance bearing data which are supplied from a self-vehicle location detection means, and is made to display it on a display 14.

[0020] A car guidance-and-control means is based on path data, and a self-vehicle location and advance bearing data, when induction with voice is specified. They are for example, "100-meter beyond and right-turn in supplying the sound signal which changed and changed into the sound signal the voice message data which generated the voice message data concerning course induction, and was generated through the speech synthesis output unit before the following course changed part to the loudspeaker 13 for voice induction. Voice-told messages, such as ", are made to output. When the induction on the display image of a display 14 is specified, a car guidance-and-control means supplies course tbe data, such as data which specify the crossing which makes a course change, right-turn, and left turn, the distance data to a course modification point, etc. to a display lot Fig. display-control means, and displays the text which shows the distance to the induction bearing marks and course modification points, such as right-turn and left turn, on the screen of a display 14.

[0021] An actuation input recognition means supplies various kinds of set-up conditions to each control means while it recognizes various kinds of actuation inputs made by the control unit 12 and sets up a display condition and induction conditions according to an actuation input.

[0022] Drawing 4 is the block block diagram of a HUD lot Fig. display-control means. The HUD lot Fig. display-control means 20 is equipped with the planar map generation means 21, the bird's-eye view generation means 22, the course map generation means 23, the display map selection means 24, the map image rotation means 25, and the image composition means 26.

[0023] The planar map generation means 21 generates the planar map of a whole surface same scale based on map data 6a read through the map information playback section 6, map display direction tbe-data 20a, and scale tbe-data 20b. When making the travelling direction of a car into the bottom by map display direction tbe-data 20a is specified, the planar map generation means 21 generates the planar map with which the travelling direction of a car serves as a front based on a self-vehicle location and advance

bearing data 20c. When turning to make north into the bottom by map display direction tbe-data 20a and the direction of the destination (or course ground) up is specified, the planar map generation means 21 generates the planar map with which a northing display or the direction of the destination serves as the bottom. In addition, the map display direction and a scale can be specified by the control unit 12.

[0024] The planar map generation means 21 will perform the display which shows the delay section, if delay road section data 20d is supplied from the communications department 10. The current position of a car serves as a lower limit of a map, or the current position of a car carries out sequential generation of the planar map generation means 21 at transit of a car with the planar map which separated from a few from the lower limit of a map. The planar map generation means 21 generates a planar map including the mark which shows bearing of a map. The planar map generation means 21 generates the planar map which displays an induction path based on path data (induction path data) 20e.

[0025] The bird's-eye view generation means 22 generates a bird's-eye view based on the view location specified by 20f of bird's-eye view view tbe data, view height, and the direction of a look. The view location at which it looks down, view height, and the direction of a look can be specified by the control unit 12. By setting a view location as the method of method Kogo of advance of a self-vehicle location, a bird's-eye view including the current position can be displayed. By setting up view height highly, it can look down at the large range. The bird's-eye view of other directions can also be displayed by setting up the direction of a look in addition to a travelling direction. The bird's-eye view generation means 22 will perform the display which shows the delay section, if delay road section data 20d is supplied. The bird's-eye view generation means 22 generates a map including the mark which shows bearing of a map. The bird's-eye view generation means 22 generates the map which displays an induction path based on path data (induction path data) 20e.

[0026] The course map generation means 23 generates the course map which consists of a mark which indicates induction bearing to be the perspective indicator chart of a road showing a crossing location based on course induction data (data concerning distance and course modification bearing to course modification point) 20g supplied from a car guiding means. When projected by the windshield 3 through projector equipment 4, the course map generation means 23 generates a course map so that it may lap with front sights (road etc.) mostly.

[0027] Based on 20h of map select data, the display map selection means 24 chooses any one of a planar map, a bird's-eye view, and the course maps, and supplies it to the map image rotation means 25. It can be set up by the control unit 12 whether which map is chosen.

[0028] The example of the planar map generated with the planar map generation means 21 is shown in drawing 5 . The example of the bird's-eye view generated with the bird's-eye view generation means 22 is shown in drawing 6 . The example of the course map generated with the course map generation means 23 is shown in drawing 7 .

[0029] The map image rotation means 25 generates the map rotated by the include angle specified based on angle-of-rotation tbe-data 20i by setting a revolving shaft as the upper limit (or shaft parallel to upper limit) of the generated map, as shown in drawing 8 . The map compressed in the vertical direction is generated, so that an angle of rotation is specified small. In addition, when rotation assignment is not made, the map image rotation means 25 supplies the map supplied from the display map selection means 24 to the image composition means 26 as it is. About the text displayed on a map, the map image rotation means 25 asks for the display position of the text after rotation processing, and displays the alphabetic character generated with the character generator etc. on the display position for which it

asked while it performs rotation processing to segment data, such as a road.
[0030] Rotation processing is made by the map image rotation means 25, and the example of the bird's-eye view where the vertical direction was reversed is shown in drawing 9 .
[0031] The image composition means 26 is in the condition that the planar map or the bird's-eye view is chosen based on 20h of map select data, when course guidance demand 20j is supplied, compounds the planar map or bird's-eye view supplied from the map image rotation means 25, and the course map generated with the course map generation means 23, and supplies the compound map image to projector equipment 4. As shown in drawing 10 , a planar map or a bird's-eye view compounds the image composition means 26 to the down side, as mostly lapped with a front sight in a course map above an operator's look height. When course guidance demand 20j is not supplied, the image composition means 26 supplies the map image supplied from the map image rotation means 25 to projector equipment 4. It can be set up by the control unit 12 whether it is displayed that a course map laps with a front sight mostly (is course guidance demand 20j generated or not?).
[0032] The planar map generation means 21 and the bird's-eye view generation means 22 generate the map showing the road field corresponding to the road section displayed with a course map based on induction path data 20g, when course guidance demand 20j is supplied. At drawing 10 , the correspondence field is displayed by expressing the road field corresponding to the road section currently displayed with the course map in the bird's-eye view which carried out vertical inverse video as a thick wire. The correspondence field may be indicated by flashing or it may be made to perform a hatching display to a correspondence field.
[0033] In addition, generate the map by which vertical reversal was carried out and it is made to display above a windshield, and a noninverting map is generated at the time of a car halt, and you may make it make it display it on a lower part (or upper part) from the center of a windshield during car transit. By doing in this way, it is automatically changed into the map display which will not be the hindrance of a field of view at the time of car transit.
[0034] The HUD equipment 1 applied to this invention since it is the above configuration can specify any one of the planar map shown in drawing 5 , the bird's-eye view shown in drawing 6 , or the course maps which were shown in drawing 7 , and as shown in drawing 3 , it can display the specified map above a windshield 3. Since a map image is displayed above a windshield 3, a front sight and a map display do not lap. Therefore, even if it displays a large area, if it is with the hindrance of an operator's field of view, the field of view of **** and the front is securable.
[0035] HUD equipment 1 can display the map which made the desired include angle rotate angle of rotation by setting it as arbitration to the revolving shaft shown in drawing 8 . By rotation display, the die length of the lengthwise direction of the map image displayed can be adjusted. Therefore, even if it is the map of the same viewing area, it is possible to shorten the die length of the lengthwise direction of a display image, and to secure a forward-viewing community further.
[0036] Moreover, the map reversed in the vertical direction by rotation display can be displayed. The display same with the whole path serving as a display gestalt by which it was indicated by projection high up in the sky, installing a huge mirror high up in the sky, and looking at the ground by carrying out vertical reversal and displaying a bird's-eye view, is made. For this reason, the situation of the front and the whole path can be grasped exactly. Although sense of incongruity may be felt the part which is not visible in the shadow of a building etc. in the usual bird's-eye view which does not carry out vertical

reversal, the whole path can cancel sense of incongruity high up in the sky with the display gestalt by which it was indicated by projection.

[0037] Furthermore, as shown in drawing 10, this HUD equipment 1 is in the condition of displaying the planar map or the bird's-eye view above a windshield 3, and can display a course map on that lower part. Since a thick wire indication of the field corresponding to the road section displayed with the course map is given for example, all over a bird's-eye view, both contrast is easy.

[0038] In addition, since the delay section is displayed on a map in this example, it becomes easy to take the path which avoided the delay section.

[0039]

[Effect of the Invention] Since it considered as the configuration which displays an induction path more nearly up than the road of a sight, even if the navigation equipment applied to this invention as explained above performs the map display of a large area, it does not serve as hindrance of an operator's field of view, but can secure a forward-viewing community.

[0040] Moreover, the display same with the whole path serving as a display gestalt by which it was indicated by projection high up in the sky, installing a huge mirror high up in the sky, and looking at the ground by carrying out vertical reversal and displaying a bird's-eye view, is made. For this reason, the situation of the front and the whole path can be grasped exactly. Although sense of incongruity may be felt the part which is not visible in the shadow of a building etc. in the usual bird's-eye view which does not carry out vertical reversal, the whole path can cancel sense of incongruity high up in the sky with the display gestalt by which it was indicated by projection.

[0041] Since the display image of an induction path is displayed more nearly up than the road of a sight, the contents of a display of the course guidance image it is displayed that laps with a sight can be made brief. Moreover, it becomes easy for the display of a course guidance image and the front sight to have piled up strictly, to be put together, and to grasp a course as there being nothing because the contrast with the road section displayed with the course guidance image and the applicable section in the display image of an induction path considers as an easy display gestalt.

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TECHNICAL FIELD

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PRIOR ART

[Description of the Prior Art] A HUD is used for JP,61-200571,A and the transit position read out device for cars with which made it make a road map and the current position of a self-car emerge in the visual field of the crew ahead of a car is indicated.
[0003] an operator looks at the road map by which coordinate transformation was carried out to the perspective display at JP,1-219883,A through a windshield to a windshield -- real -- it projects so that it may lap between the same distance as a view, and the display of the navigation system for mount equipped with a projection means to display as a HUD is indicated.

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EFFECT OF THE INVENTION

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[0040] Moreover, the display same with the whole path serving as a display gestalt by which it was indicated by projection high up in the sky, installing a huge mirror high up in the sky, and looking at the ground by carrying out vertical reversal and displaying a bird's-eye view, is made. For this reason, the situation of the front and the whole path can be grasped exactly. Although sense of incongruity may be felt the part which is not visible in the shadow of a building etc. in the usual bird's-eye view which does not carry out vertical reversal, the whole path can cancel sense of incongruity high up in the sky with the display gestalt by which it was indicated by projection.
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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The conventional display enables it to see display images (road map etc.) in the condition of not moving most looks from a travelling direction by displaying a road map and the induction bearing mark caudad rather than the height of a look while an operator operates, as shown in the conventional display position in drawing 3 .

[0005] However, possible in a display rectangle so that a display image may not serve as hindrance of a forward-viewing community, when displaying display images (road map etc.) on a look are . It restricts, and it is necessary to make it small or to make the contents of a display brief. For this reason, it was not suitable for displaying the road map and bird's-eye view of the comparatively large range.

[0006] It aims at offering the HUD equipment with which it would not be made in order that this invention might solve such a technical problem, and a large area display will not be the hindrance of a field of view, either.

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MEANS

[Means for Solving the Problem] The HUD equipment applied to claim 1 in order to solve said technical problem is characterized by displaying the display image of an induction path more nearly up than the road of a sight.
[0008] The display image of an induction path has a side good for the display screen bottom near a car also as an image made [axial symmetry] to carry out vertical reversal centering on a display axis of abscissa so that a distant place may become the display screen bottom. Moreover, the display image of an induction path may be made to indicate the display axis of abscissa at arbitration by rotation as a shaft. The display image of an induction path is good also as a bird's-eye view.
[0009] The HUD equipment concerning claim 5 is characterized by making it display that a course guidance image laps with the road of a sight mostly while it displays the display image of an induction path more nearly up than the road of a sight. It is desirable to display the road section corresponding to the road section displayed with the course guidance image on the display image of the induction path displayed more nearly up than the road of said sight.
[0010] Since an induction path is displayed more nearly up than the road of a sight, even if the HUD equipment concerning claim 1 displays a large area, it does not serve as hindrance of an operator's field of view.
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[0013]

[Embodiment of the Invention] The gestalt of implementation of this invention is explained based on an accompanying drawing below. Drawing 1 is the whole HUD equipment block diagram concerning this invention. The HUD equipment 1 concerning this invention consists of projector equipment 4 which performs image display using navigation equipment 2 and a windshield 3.

[0014] The explanatory view in which drawing 2 shows the physical relationship of an operator and a look, and drawing 3 are the explanatory views showing the display position of the HUD equipment concerning this invention. The HUD equipment 1 concerning this invention displays an image on the location which serves as the upper part from an operator's look.

[0015] CD-ROM5 in which the navigation equipment 2 shown in drawing 1 stored road map data, The map information playback section 6 which reads road map data from CD-ROM5, The GPS equipment 7 which receives the electric wave from two or more GPS Satellites, and outputs LONG, the LAT, and advanced data, The vehicle speed (or mileage) sensor 8 and the bearing sensor 9, The communication link with VICS (Vehicle Information and Communication System), ATIS (Advanced TrafficInformation Service), etc. is performed. The newest traffic information It consists of the communications department 10 for receiving, the signal-processing section 11, a control unit 12, a loudspeaker 13 for voice induction, and a display 14 equipped with CRT, a liquid crystal display, etc.

[0016] The signal-processing section 11 is equipped with a self-vehicle location detection means, a routing means, a display lot Fig. display-control means, a car guidance-and-control means, an actuation input recognition means, and a HUD lot Fig. display-control means.

[0017] A self-vehicle location detection means is using together the dead reckoning equipment which operates the location of a car sequentially based on a bearing signal, and the vehicle speed, the vehicle speed from the mileage sensor 8 or the mileage signal from the bearing sensor 9 constituted using the gyroscope, the earth-magnetism sensor, etc., and the GPS equipment 7 of a car which detects a location absolutely, and even when the electric wave from a GPS Satellite cannot be received, it is considering as the configuration which can guess the current position of a car. Moreover, this self-vehicle location detection means compares a transit locus operation means to ask for a transit locus with the transit locus data and road map data outputted from this transit locus operation means, and is equipped with a map matching means to correct the current position of a car to a path on the street paying attention to the description part of transit loci, such as a crossing and an inflection point. A self-vehicle location detection means outputs the current position data and advance bearing data of a car.

[0018] A routing means will output the path data which set automatically and set up the path in which it results to the destination from the specified origin or the current position of a car with reference to road map data, if the course ground and an origin are inputted the destination and if needed from a control unit 12.

[0019] While a display lot Fig. display-control means reads map data including the current position of a car from CD-ROM5 through the map information playback section 6 and generates a map image, it generates the map image which includes a self-vehicle location mark based on the current position data and the advance bearing data which are supplied from a self-vehicle location detection means, and is made to display it on a display 14.

[0020] A car guidance-and-control means is based on path data, and a self-vehicle location and advance bearing data, when induction with voice is specified. They are for example, "100-meter beyond and right-turn in supplying the sound signal which changed and changed into the sound signal the voice message data which generated the voice message data concerning course induction, and was generated

through the speech synthesis output unit before the following course changed part to the loudspeaker 13 for voice induction. Voice-told messages, such as ", are made to output. When the induction on the display image of a display 14 is specified, a car guidance-and-control means supplies course tbe data, such as data which specify the crossing which makes a course change, right-turn, and left turn, the distance data to a course modification point, etc. to a display lot Fig. display-control means, and displays the text which shows the distance to the induction bearing marks and course modification points, such as right-turn and left turn, on the screen of a display 14.

[0021] An actuation input recognition means supplies various kinds of set-up conditions to each control means while it recognizes various kinds of actuation inputs made by the control unit 12 and sets up a display condition and induction conditions according to an actuation input.

[0022] Drawing 4 is the block block diagram of a HUD lot Fig. display-control means. The HUD lot Fig. display-control means 20 is equipped with the planar map generation means 21, the bird's-eye view generation means 22, the course map generation means 23, the display map selection means 24, the map image rotation means 25, and the image composition means 26.

[0023] The planar map generation means 21 generates the planar map of a whole surface same scale based on map data 6a read through the map information playback section 6, map display direction tbe-data 20a, and scale tbe-data 20b. When making the travelling direction of a car into the bottom by map display direction tbe-data 20a is specified, the planar map generation means 21 generates the planar map with which the travelling direction of a car serves as a front based on a self-vehicle location and advance bearing data 20c. When turning to make north into the bottom by map display direction tbe-data 20a and the direction of the destination (or course ground) up is specified, the planar map generation means 21 generates the planar map with which a northing display or the direction of the destination serves as the bottom. In addition, the map display direction and a scale can be specified by the control unit 12.

[0024] The planar map generation means 21 will perform the display which shows the delay section, if delay road section data 20d is supplied from the communications department 10. The current position of a car serves as a lower limit of a map, or the current position of a car carries out sequential generation of the planar map generation means 21 at transit of a car with the planar map which separated from a few from the lower limit of a map. The planar map generation means 21 generates a planar map including the mark which shows bearing of a map. The planar map generation means 21 generates the planar map which displays an induction path based on path data (induction path data) 20e.

[0025] The bird's-eye view generation means 22 generates a bird's-eye view based on the view location specified by 20f of bird's-eye view view tbe data, view height, and the direction of a look. The view location at which it looks down, view height, and the direction of a look can be specified by the control unit 12. By setting a view location as the method of method Kogo of advance of a self-vehicle location, a bird's-eye view including the current position can be displayed. By setting up view height highly, it can look down at the large range. The bird's-eye view of other directions can also be displayed by setting up the direction of a look in addition to a travelling direction. The bird's-eye view generation means 22 will perform the display which shows the delay section, if delay road section data 20d is supplied. The bird's-eye view generation means 22 generates a map including the mark which shows bearing of a map. The bird's-eye view generation means 22 generates the map which displays an induction path based on path data (induction path data) 20e.

[0026] The course map generation means 23 generates the course map which consists of a mark which indicates induction bearing to be the perspective indicator chart of a road showing a crossing location

based on course induction data (data concerning distance and course modification bearing to course modification point) 20g supplied from a car guiding means. When projected by the windshield 3 through projector equipment 4, the course map generation means 23 generates a course map so that it may lap with front sights (road etc.) mostly.

[0027] Based on 20h of map select data, the display map selection means 24 chooses any one of a planar map, a bird's-eye view, and the course maps, and supplies it to the map image rotation means 25. It can be set up by the control unit 12 whether which map is chosen.

[0028] The example of the planar map generated with the planar map generation means 21 is shown in drawing 5 . The example of the bird's-eye view generated with the bird's-eye view generation means 22 is shown in drawing 6 . The example of the course map generated with the course map generation means 23 is shown in drawing 7 .

[0029] The map image rotation means 25 generates the map rotated by the include angle specified based on angle-of-rotation tbe-data 20i by setting a revolving shaft as the upper limit (or shaft parallel to upper limit) of the generated map, as shown in drawing 8 . The map compressed in the vertical direction is generated, so that an angle of rotation is specified small. In addition, when rotation assignment is not made, the map image rotation means 25 supplies the map supplied from the display map selection means 24 to the image composition means 26 as it is. About the text displayed on a map, the map image rotation means 25 asks for the display position of the text after rotation processing, and displays the alphabetic character generated with the character generator etc. on the display position for which it asked while it performs rotation processing to segment data, such as a road.

[0030] Rotation processing is made by the map image rotation means 25, and the example of the bird's-eye view where the vertical direction was reversed is shown in drawing 9 .

[0031] The image composition means 26 is in the condition that the planar map or the bird's-eye view is chosen based on 20h of map select data, when course guidance demand 20j is supplied, compounds the planar map or bird's-eye view supplied from the map image rotation means 25, and the course map generated with the course map generation means 23, and supplies the compound map image to projector equipment 4. As shown in drawing 10 , a planar map or a bird's-eye view compounds the image composition means 26 to the down side, as mostly lapped with a front sight in a course map above an operator's look height. When course guidance demand 20j is not supplied, the image composition means 26 supplies the map image supplied from the map image rotation means 25 to projector equipment 4. It can be set up by the control unit 12 whether it is displayed that a course map laps with a front sight mostly (is course guidance demand 20j generated or not?).

[0032] The planar map generation means 21 and the bird's-eye view generation means 22 generate the map showing the road field corresponding to the road section displayed with a course map based on induction path data 20g, when course guidance demand 20j is supplied. At drawing 10 , the correspondence field is displayed by expressing the road field corresponding to the road section currently displayed with the course map in the bird's-eye view which carried out vertical inverse video as a thick wire. The correspondence field may be indicated by flashing or it may be made to perform a hatching display to a correspondence field.

[0033] In addition, generate the map by which vertical reversal was carried out and it is made to display above a windshield, and a noninverting map is generated at the time of a car halt, and you may make it make it display it on a lower part (or upper part) from the center of a windshield during car transit. By

doing in this way, it is automatically changed into the map display which will not be the hindrance of a field of view at the time of car transit.

[0034] The HUD equipment 1 applied to this invention since it is the above configuration can specify any one of the planar map shown in drawing 5 , the bird's-eye view shown in drawing 6 , or the course maps which were shown in drawing 7 , and as shown in drawing 3 , it can display the specified map above a windshield 3. Since a map image is displayed above a windshield 3, a front sight and a map display do not lap. Therefore, even if it displays a large area, if it is with the hindrance of an operator's field of view, the field of view of **** and the front is securable.

[0035] HUD equipment 1 can display the map which made the desired include angle rotate angle of rotation by setting it as arbitration to the revolving shaft shown in drawing 8 . By rotation display, the die length of the lengthwise direction of the map image displayed can be adjusted. Therefore, even if it is the map of the same viewing area, it is possible to shorten the die length of the lengthwise direction of a display image, and to secure a forward-viewing community further.

[0036] Moreover, the map reversed in the vertical direction by rotation display can be displayed. The display same with the whole path serving as a display gestalt by which it was indicated by projection high up in the sky, installing a huge mirror high up in the sky, and looking at the ground by carrying out vertical reversal and displaying a bird's-eye view, is made. For this reason, the situation of the front and the whole path can be grasped exactly. Although sense of incongruity may be felt the part which is not visible in the shadow of a building etc. in the usual bird's-eye view which does not carry out vertical reversal, the whole path can cancel sense of incongruity high up in the sky with the display gestalt by which it was indicated by projection.

[0037] Furthermore, as shown in drawing 10, this HUD equipment 1 is in the condition of displaying the planar map or the bird's-eye view above a windshield 3, and can display a course map on that lower part. Since a thick wire indication of the field corresponding to the road section displayed with the course map is given for example, all over a bird's-eye view, both contrast is easy.

[0038] In addition, since the delay section is displayed on a map in this example, it becomes easy to take the path which avoided the delay section.

[Translation done.]

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The whole HUD equipment block diagram concerning this invention
[Drawing 2] The explanatory view showing the physical relationship of an operator and a look
[Drawing 3] The explanatory view showing the display position of the HUD equipment concerning this invention
[Drawing 4] The block block diagram of a HUD lot Fig. display-control means
[Drawing 5] The explanatory view showing an example of a planar map
[Drawing 6] The explanatory view showing an example of a bird's-eye view
[Drawing 7] The explanatory view showing an example of a course map
[Drawing 8] The explanatory view of map image rotation processing
[Drawing 9] The explanatory view showing an example of the bird's-eye view where the upper and lower sides were reversed
[Drawing 10] The explanatory view showing the example of a synthetic display of the bird's-eye view and course map with which the upper and lower sides were reversed
[Description of Notations]
1 HUD Equipment
2 Navigation Equipment
3 Windshield
4 Projector Equipment
11 Signal-Processing Section
20 HUD Lot Fig. Display-Control Means
21 Planar Map Generation Means
22 Bird's-eye View Generation Means
23 Course Map Generation Means
24 Display Map Selection Means
25 Map Image Rotation Means
26 Image Composition Means

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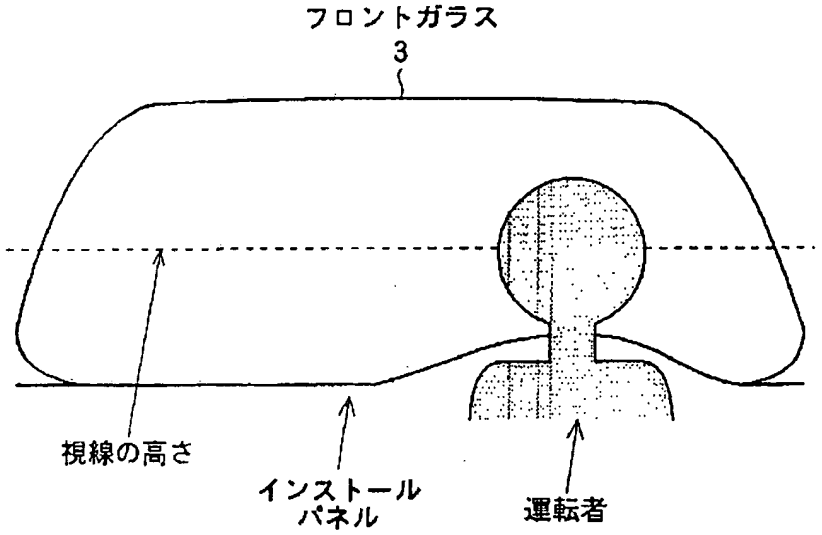
3.In the drawings, any words are not translated.

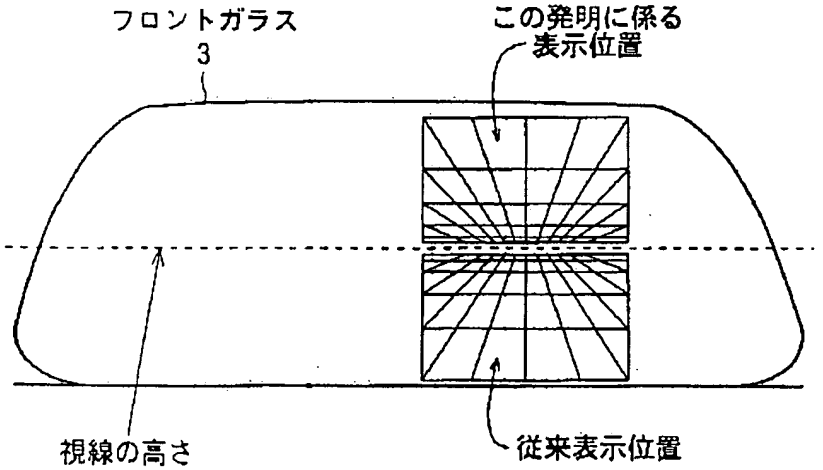
DRAWINGS

[Drawing 2]



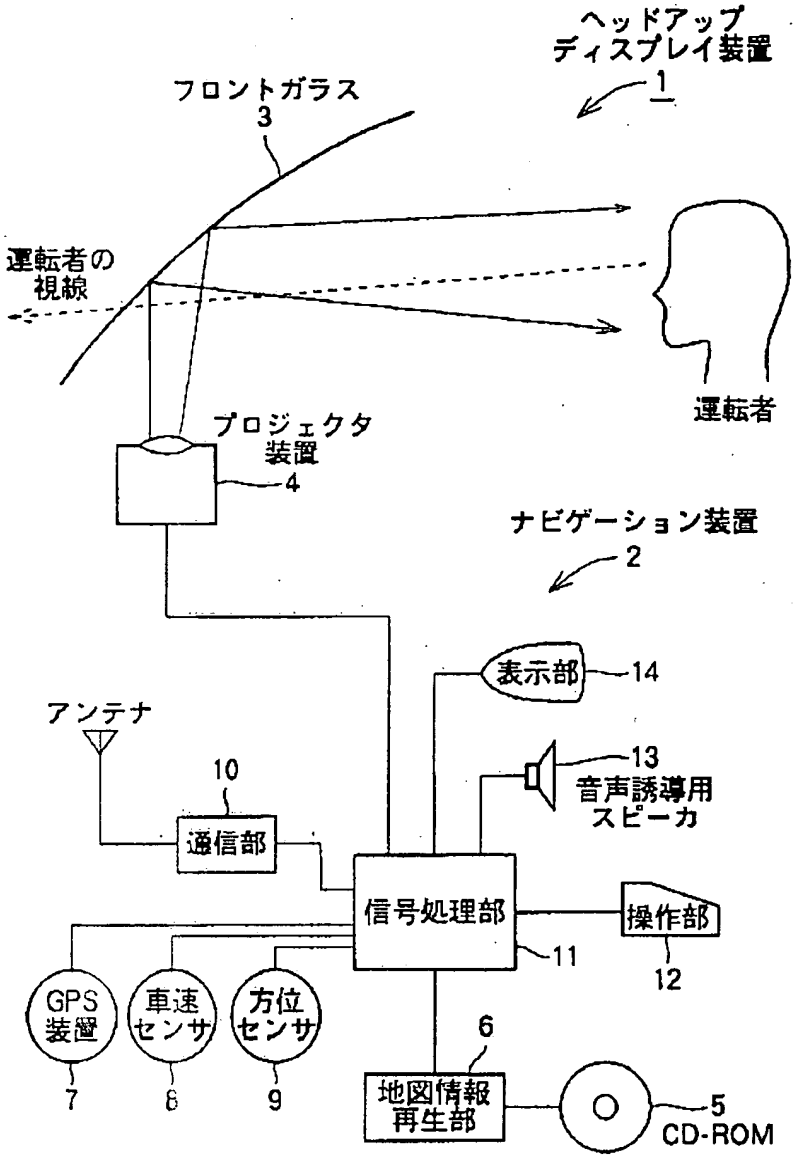
運転者と視線の位置関係

[Drawing 3]

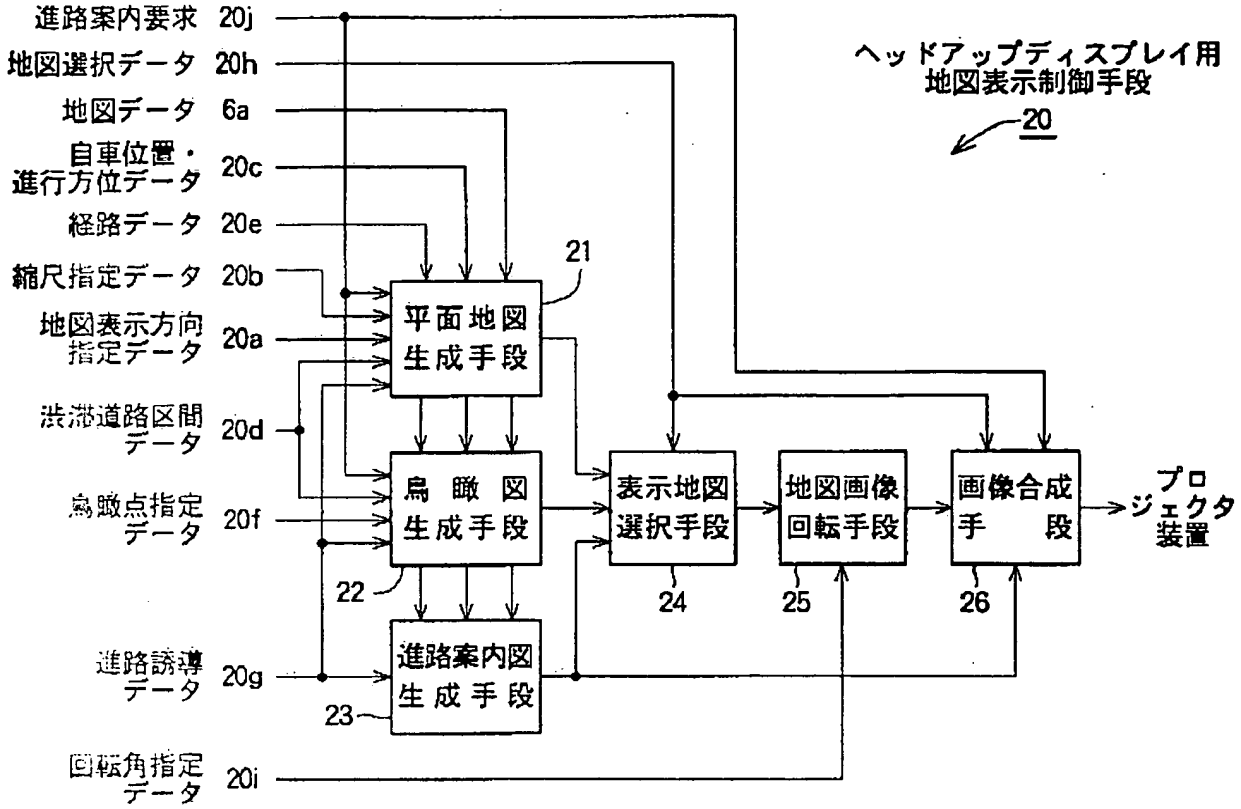


表示位置

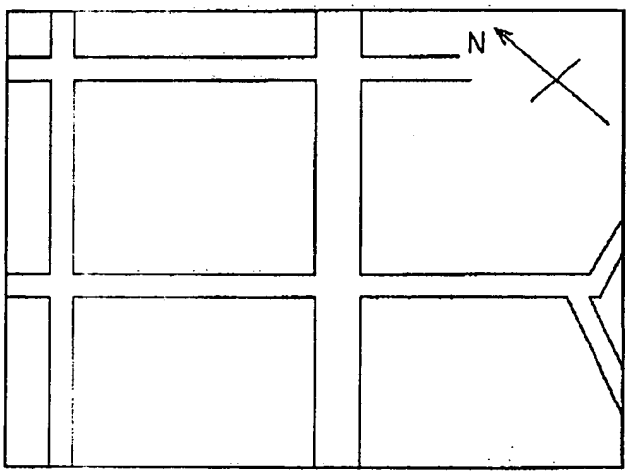
[Drawing 1]


ヘッドアップ
ディスプレイ装置
1
フロントガラス
3
運転者の
視線
運転者
プロジェクタ
装置
4
ナビゲーション装置
2
表示部
14
アンテナ
10
13
音声誘導用
スピーカ
通信部
信号処理部
操作部
11
12
GPS
装置
車速
センサ
方位
センサ
6
7
8
9
地図情報
再生部
5
CD-ROM

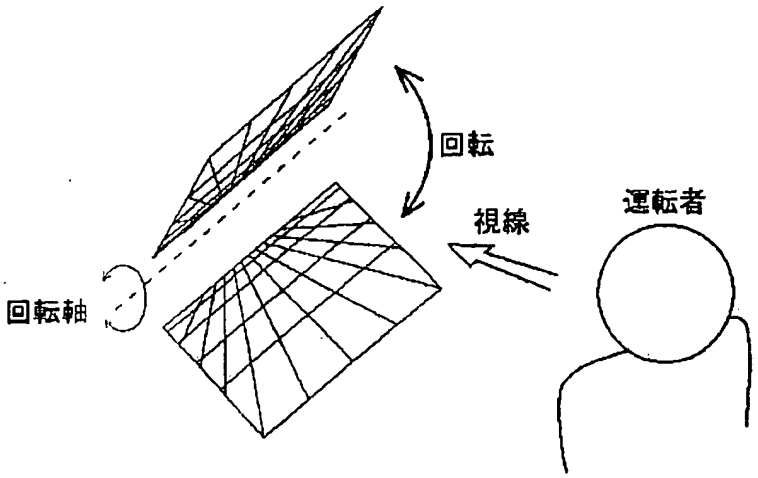
[Drawing 4]



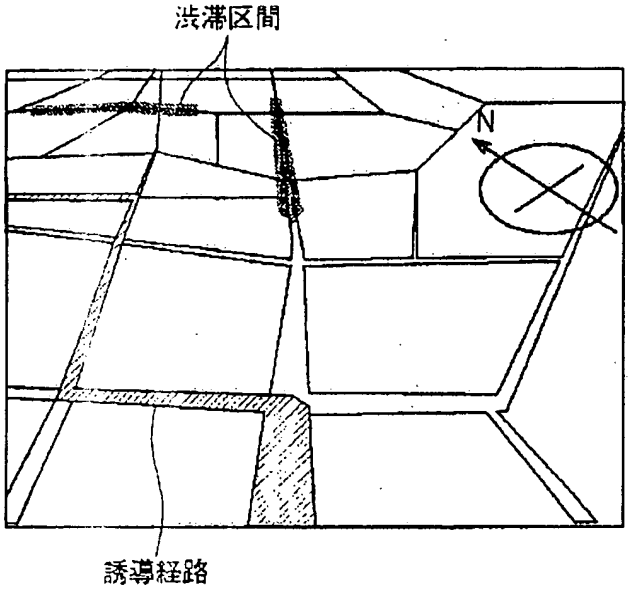
[Drawing 5]



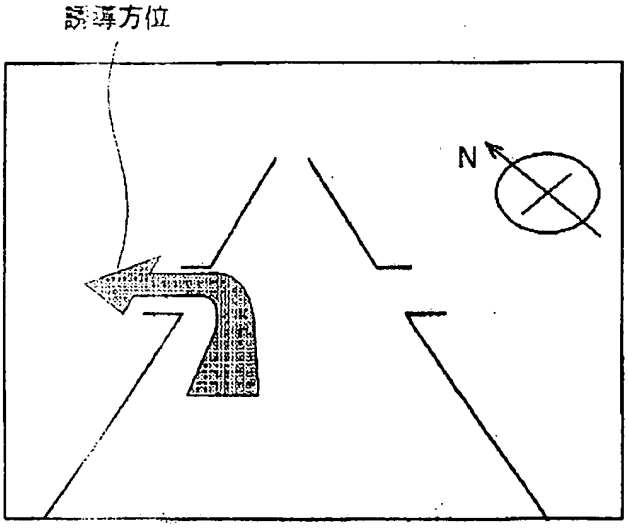
[Drawing 8]



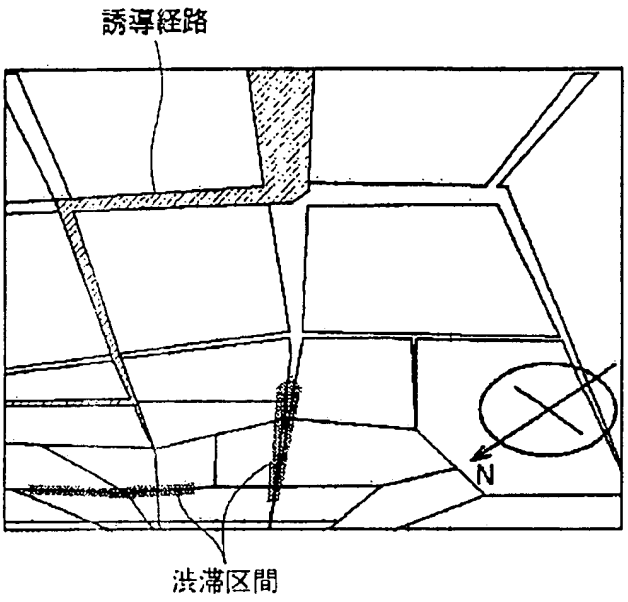
[Drawing 6]



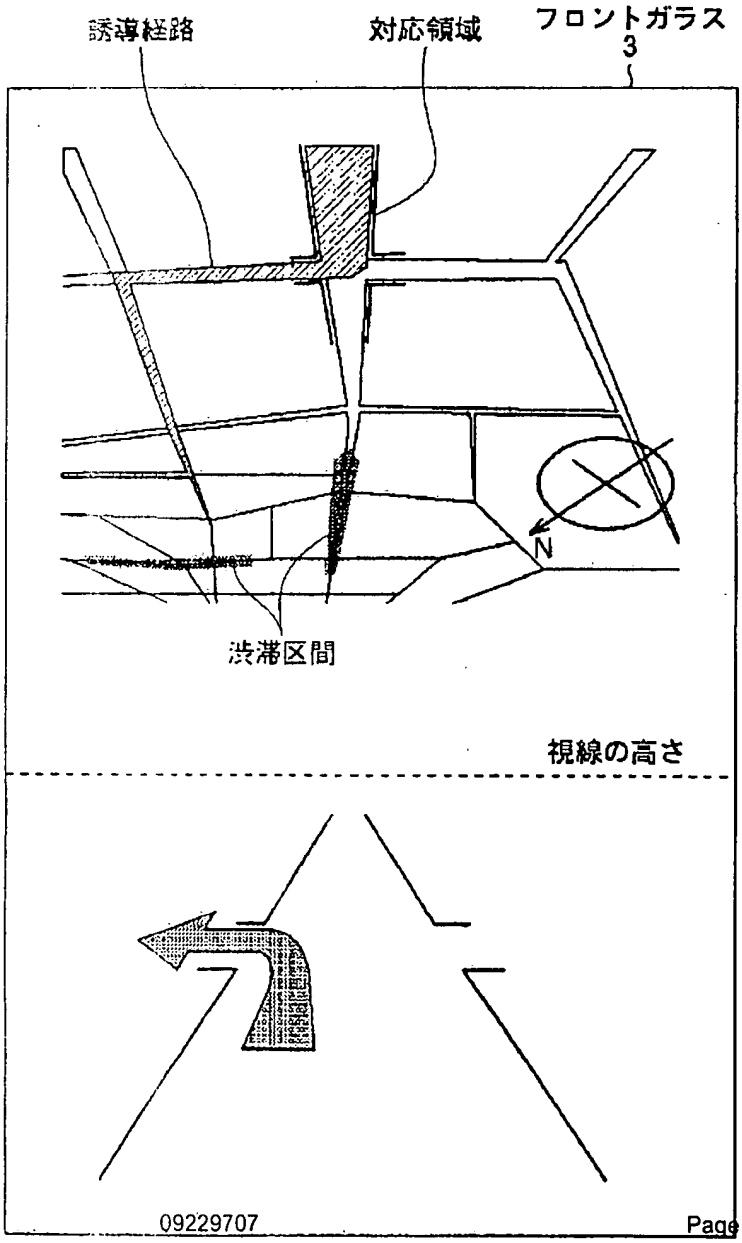
[Drawing 7]



[Drawing 9]



[Drawing 10]



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